

## Digital Game-Based Learning: Learning Theories and Their Applications in Digital Games

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### Abstract

GBL stands for Game-based learning and means game-based learning, an educational approach that uses games to involve learners in learning and developing their skills. This method integrates learning and play in a fun, engaging and motivating way using computer-video games that can be implemented on digital devices such as computers, tablets or mobile phones; In such a way that the goal of learning is an integral part of the game and the game is an integral part of the learning process. Although GBL is heavily influenced by video games; But it goes beyond the integration of educational content with the game and by combining elements such as challenges, rewards and immediate feedback, it creates an attractive and motivating atmosphere that makes the learning process more effective and enjoyable. In a game-based learning environment, users learn new concepts and practice their skills in a risk-free and safe environment. Their progress in the game is directly related to their understanding of the knowledge and skills taught through the dynamics of the game. As one of the creative methods of game-based teaching, the main goal of GBL is not just entertainment; Rather, teaching specific learning goals is a great way to facilitate learning, motivate, change behavior, and feel successful along with fun. The game-based teaching method has grown tremendously over the past decade and is now one of the most effective constructive approaches to the educational process, capable of engaging learners, providing personalized learning experiences, and cultivating essential skills. As modern societies continue to integrate digital technologies into various aspects of everyday life – including work, learning and play – the concept of digital game-based learning (DGBL) is becoming increasingly influential. The term DGBL is often used to describe the relationship of computer-based games (including games played on dedicated game consoles and mobile devices) to various learning processes or outcomes. The concept of DGBL originates from interdisciplinary research in computer and social sciences as well as humanities. As interest in computer games and learning in education expanded in the late 20th century, DGBL became a controversial term. Even basic concepts such as the definition of games (as well as their relationship to simulations and similar artifacts), the possibilities of digital methods, and the question of what counts as learning. In this article, we discuss Learning Theories and Their Applications in Digital Games.

**Key words:** Digital Game, Learning, Learning Theories, Digital.

### Introduction



Considering the global importance of second language learning, there is always a need for effective language learning approaches and methods. With the rapid development of educational technologies, "game-based learning" and especially language learning based on digital games are emerging as specialized fields that have remarkable potential and have attracted the attention of learners, teachers and researchers.

In fact, in the field of teaching and learning foreign languages, the motivation of the language learner - in the various spectrums of students, students and other language learners who learn languages with different goals - is one of the important factors in the beginning and continuation of learning. Desperation and inability and loss of motivation and lack of perseverance to continue learning are one of the challenges of the language learning process. To face these challenges, experts and researchers recommend using games for teaching. According to the research conducted on the effects of computer and digital games on language learning, in this article we will first examine what a game is and the approach and viewpoint of some experts in the past decades regarding its relationship with learning and especially language learning at different age and educational levels. Then, based on new researches, the types of digital games and their use for different aspects of language learning are examined. Also, some theories of language learning and communication and how to use them for language learning based on digital games are studied; And then the research achievements and recommendations provided by researchers for designing digital games based on language learning are studied. Thus, in this article, the following axes have been tried to be studied:

1. Theoretical dimensions and theory of language learning based on digital games.
2. The results of the findings of the effect of digital games on language learning and
3. The proposals presented by the researchers for more suitable design of digital games based on language learning.

## Research background

Remarkable studies have been done on language learning using games, especially digital games and computers. Zou et al (2021) from the Hong Kong University of Education in the latest study in 2022 studied the number of 21 articles published on computer games for learning foreign words in scientific journals.

The results of the study have proven the positive effect of these games in improving and increasing short and long-term learning of vocabulary, making it easier to understand content through reading and listening, increasing motivation and commitment, reducing anxiety and strengthening interaction between learners. The findings have provided important and meaningful results for learning and game design. The studies of this group of researchers have shown that learning foreign language vocabulary based on digital games has attracted the increasing attention of linguists and education experts.







Learning management system, which is considered as a component of e-learning, interactive whiteboards, e-portfolio, e-dictionary, e-vocabulary, intelligent educational systems, grammar review, digital games, social networks, blogs, forums, wikis and mobile devices. However, the most up-to-date technologies in this field of research are progressing rapidly (Zou et al., 2021). According to the researches done on the effect of computer and digital games on language learning, in this article, we will first examine what a game is and the approach and point of view of some experts in the past decades, we are dealing with its relationship with learning and especially language learning at different age and educational levels. The game is a reality with many dimensions and it is looked at from different aspects: from an educational aspect and from the aspect of its conflict with education and learning. In preschool education in most countries, play is the main activity through which learning is done by the child. In this way, from the point of view of education experts, the game is not considered a tool or a means of learning, but a way of life, and it should be present in children's activities for learning, but as the child grows older, it should be transformed into exercises and homework.

Zaphiris and Ang (2008) have identified six main components by examining one of the definitions of the game:

A game is a rule-based system that has a variable and measurable outcome, and in which different outcomes are given different values and values, the player tries to influence the outcome, the player feels dependent on the outcome.

And the results of the activity are optional and debatable. According to this definition, the game includes the following six components:

1. Rules: Games are based on rules.
2. Results: Games have variable and measurable results.
3. Value: different values are assigned to different results of the game, some positive and some negative.
4. Trying: The player should try to influence the result.
5. Player attachment: Players are dependent on the results of the game in the sense that if the result is positive, the player will be the winner and "happy" and if the result is negative, the player will be the loser and "unsatisfied".
6. Agreeable results: The game can be played in two ways - with or without real results. The constituent elements of the game, including challenge, competition and reward, create emotions such as joy, fear, surprise and hatred in a person.

According to language education experts, games cannot be considered independently and alone as a solution to learning problems. In all cases, the effectiveness of educational games depends on a set of different actions. Whether the game has an educational aspect or not, it



has three important benefits. Game-based activities, by creating motivation in the people who play the game, arouse the desire to go further and beyond. Also, the game involves the body parts, senses and emotions, and in this way, it leads the person towards communicative behavior. In addition, this game has emotional benefits; Because assigning different roles in different situations in the game (opponent, teammate, partner, etc.) makes the player avoid selfishness and self-centeredness (Haydée & Abry-Deffayet, 2008).

Susan Halliwell in her book "Teaching English in Elementary School" in 1995, after examining and identifying children's instincts, suggests teachers to consider these instincts to increase their motivation. In this way, mentioning the "instinct of play", he states that "children have a natural tendency to turn everything into a game."

In this way, the game plays the main role in learning because fun and entertainment arouses the desire to communicate, which causes pleasure and, as a result, motivation.

### **The emergence of serious games with educational purposes**

The term "serious game" is a combination of two words "game" that evokes the concept of an activity without a serious purpose and only entertainment and the word "serious" that describes the type of game. Serious game is actually a purposeful game that is designed and made using computer games and its main purpose is not entertainment (Djaouti et al., 2011).

The history of serious games goes back to video games, some of which were made with educational purposes. The goals of serious games, in the order of their origin, are: introducing and explaining research studies, training experts, and transmitting and publishing the message. For example, many serious games, including computer chess games, were created by scientists who intended to conduct research in the field of computers and artificial intelligence. In fact, the ancestors of serious games are found in the fields of education, healthcare, defense, art, culture, and religion (Djaouti et al., 2011).

Since the beginning of the 20th century, the use of computers for education has developed significantly. The "teaching machine" invented in 1924 by Pressy Sidney, professor of psychology at Ohio University, proposed questions with four answers, and the interesting thing is that the next question appeared only when the previous question was answered correctly; And in fact, students learned the material by observing the correct answer. In fact, this invention proved for the first time that it is possible to get help from a machine for teaching. Another point was the role of feedback for learning. In fact, in a computer game, the role of feedback is observed, which is one of the pillars of education, especially one of the important topics in language education. Today, researchers consider the serious game as one of the types of digital games that have been studied about its effect on learning. In this article, it will be discussed again in the section titled "serious games and language learning".

Language learning and games. The elements of language teaching usually include game-like exercises such as sorting words, arranging words to make a correct sentence, role-playing



for conversational practice, and written books and language teachers use these game-like things to teach language. In his book "Games in the Language Classroom" in 2008, Silva Aide has divided the games based on the use of different tools and methods and, for example, has suggested different methods for teaching numbers in the target language or correct pronunciation. According to experts, through the game, the teacher can teach addition or multiplication tables in English.

According to the research conducted on language learning by language learners and for example in the case of children, the game is a factor for creating a strong motivation and in this regard it facilitates the learning of a living language by children. The game is an effective tool for language learning due to attracting and creating commitment and creating a real space for communication. Through games, children and other language learners are given the opportunity to be effective in their learning process and have the opportunity to speak, express and exchange opinions. The use of games, in addition to creating the joy of learning, creates skills related to socialization such as self-respect, respect for others, respect for rules, and creates a pleasant environment for learning in the classroom (Haydée & Abry-Deffayet, 2008).

In a thesis research of the researchers, By examining two English language teaching books at the elementary level, by examining the role of games in learning, they discussed the game-like elements of the two books in question and the application of "theory of multiple intelligences" in it and the dimensions of its use in terms of the impact of games on language learning and they stated that despite some criticisms that have been made to it, the theory of multiple intelligences is remarkably popular with teachers and is also used in language teaching and some language learning textbooks.

Language teaching methods based on multiple intelligences usually include the following: 1. Verbal-linguistic intelligence, which is created and strengthened through oral interactions such as dialogue and exercises related to words. 2. Logical-mathematical intelligence that is presented in the exercises of solving mathematical problems that are presented during language teaching. 3. Image-spatial intelligence when images are used in education. 4. Physical-motor intelligence: when the training is based on movement games. 5. Intrapersonal intelligence that provides a background for thinking and intellectual work. 6. Extrapersonal intelligence that provides interaction with competitors or game partners. 7. Musical intelligence that helps to imitate and pronounce the sounds of the foreign language in question (Bour & Hoyet, 2012).

One of the challenges of learning for language learners is the difficulty of conscious concentration to learn vocabulary explicitly and directly for a long time, and for this reason, motivation plays the most important role in learning (Nation, 2001, cited in Zou al, 2021). In fact, motivation affects learning in different ways, and more motivated language learners usually achieve better learning results than less motivated learners (Zou et al., 2021, cited in Gardner, 2007). One of the methods that is considered to increase the interest and motivation of language learning and is commonly known among students and other



Serious games and language learning. Serious games are games that are designed for learning and include programs that are based on game principles, but their purpose is other



than entertainment and, for example, teaching skills and learning (Johnson et al., 2005, quoted by Hsu & Chen, 2019). It has been said that serious games can strengthen the motivation to learn and increase the efficiency of learning. According to researchers, good games with correct principles of learning can improve learning performance. According to the suggestion of some researchers, serious games can help increase students' learning performance due to the fact that they provide a real environment (Al et Laamarti, 2014, cited in Hsu & Chen, 2019).

Games that give feedback and then present new problems, put learners in an interactive learning environment. However, according to Boyle et al. (2016) and Connolly et al. (2012), serious games designed or used for language learning are relatively few (Hsu & Chen 2019).

For example, two serious games designed in recent years in the field of language, in order to increase the understanding of the consequences of hunger and famine, and another to increase the skill of translation, design, and at the same time, have been used to increase vocabulary knowledge.

The designers of the first game, Hitosugi et al. (2014), used it to test university students' understanding of the game and understanding of Japanese vocabulary. This study showed the improvement of vocabulary learning in the delayed post-test. The impact of the second game was also investigated by its designer Ferrer-Calvo (2017) to investigate vocabulary learning and the role of motivation.

The results showed that the students who played this game performed significantly better in the vocabulary post-test. Of course, students' self-report about motivation showed that high motivation does not only lead to successful vocabulary learning. Hsu and Chen (2019) from the National Taiwan University studied one of the serious games and studied whether vocabulary learning and history lessons can be done at the same time and what was the opinion of the participants in this game and their understanding of the serious game. Sixty-six English-EFL students participated in this game. Examining the answers of the previous and subsequent tests that were taken from the participants, showed their significant learning progress in the knowledge of vocabulary and history lessons.

According to these researchers, the reason for learning the language was the number of times they encountered the target words (at least 6 times) and the explanations in the text. It was also shown that even the learning of the words that were repeated less happened due to the game environment. The students also stated that they enjoyed a positive learning experience by participating in the serious game. These researchers suggested that language teachers use serious games for teaching. Serious games are one of the types of digital games used in language learning. In the next section, the study of digital games that are the basis of language learning is discussed.

The types of digital games are described below:



Zou et al. (2021) identified ten types of games in their study on digital game-based vocabulary learning: Tutorial or educational games, simulation games, role-playing games, sensory and movement games, game books, 3D virtual games, adventure games, card games, board games and serious games. In this section, based on the studies of this research group, the types of designed games are briefly reviewed.

**Tutorial or educational games** are games that have educational goals and are designed simply and have limited types and shapes (Criswell, 2009). For example, in a type of game by Wang and Young (2014), language learners are asked to choose the desired words based on the pictures shown on the screen from among the proposed answers and then pronounce the words to pass various obstacles. In another game designed by Huang and Wu (2017), the meanings of words or expressions in Chinese or English are provided to learners and they are asked to make English words by connecting letters in the system and practice their pronunciation.

**Simulated games:** In this type of games, in an imaginary or real environment, players solve problems or perform a mission in a simulated situation. In another simulation game by Ranalli (2008), language learners were asked to role-play to help a virtual family in order to find a job, organize a house and solve problems related to daily life. In another study by AliMohsen (2016), language students participated as surgeons in simulated knee surgeries to learn specialized medical words. In another game by Franciosi (2017), new words related to energy are taught by simulating the production and conservation of energy by matching words with meanings. In a simulated conference, the game designer Ferrer-Calvo (2017) asked the players to correctly translate the terms using multiple-choice answers.

**Role-playing games:** In these games, players are assigned roles to perform tasks (Cornillie et al., 2012). In an experimental study by Wang and Hwang (2016), participants learned vocabulary related to daily life by playing the role of children who help their parents with household chores and grocery shopping. Other methods such as flash cards for words, exercises to fill in the blanks of words and multiple choice answers were also used as exercises to complete the game.

**Motion sensor games:** In these games, technologies are used that track the player's body movements and consider them as part of playing the game. The participants of this game designed by Huang and Huang (2015) control the path of the cars with hand movements, pick the fruits and practice language exercises. In another game by Pan (2017), the participants learned the desired vocabulary by answering the word and meaning matching questions and choosing the answers by moving four taps of their feet.

**Gamified digital books:** Gamification or gamification is the process of integrating game features in non-game activities to make the activities more similar to games. These types of books have features such as interaction, confrontation and cooperation (Deterding et al., 2011). Bus and Smeets (2015) designers of this type of book showed how animation and interaction facilitate learning.



**Virtual games:** These games create a feeling of being in the desired space by providing a virtual world for the players. For example, a 3D virtual game (Al et Luccioni, 2015) allowed the players to see the objects and elements in the game from different angles and viewpoints and interact with them.

**Adventure games:** These games usually have interactive stories that are guided by exploration and puzzle solving and include game features such as fantasy, rules, goals and challenges, stimuli, and communication or cooperation. In one of its types, the game has two methods. In the first method, in the zoo environment, the players have to find the escaped animals and take them to the previous place. In another method, players must recognize and identify elements and items from all the elements shown (Sandberg et al., 2014).

**Games using flash cards:** in this type of game, players play the game by turn (Tsai et al., 2015). In a study by McGraw et al. (2009), the game was played in two ways: the players played the game by talking and speaking with verbal commands, and in the other way by listening and following the computer commands and moving the cards with the mouse. In a game designed by Wei et al. (2018), they learned the target vocabulary by throwing digital dice and doing exercises to fill in the blanks and reviewing the completed exercises.

**Serious games:** As noted, this type of game was examined in a separate section under the title of "serious games and language learning". The purpose of serious games is to motivate students to learn through entertainment and has three main benefits in the educational environment:

1. Acting instead of explaining, which increases motivation and satisfaction.
2. Creating a context for a personal learning experience that widely provides the possibility of learning according to the level, motivation and different learning methods of students.
3. Support decision-making and problem-solving activities and actions in a virtual environment (Aleson & Nieto-Guillén 2012, Carbonell).

In this field, Yu (2018) has invented games for teaching language and especially learning vocabulary. For example, a game in the form of a word match, by creating obstacles for the player/learner and considering the reward, allows the player to interact with his fellow players. Another game provides a bank of vocabulary for various uses, while offering online courses and videos that allow learners to create groups for interactive vocabulary learning. Another game includes a dictionary and a number of word banks, provides tasks to perform various tasks, and the learner must choose and personalize the words needed to perform those tasks. The studies have shown that the digital games that are specially designed for learning vocabulary have a solid theoretical foundation. Although some games are designed based on one or two linguistic or educational theories, digital games are desirable games.

which are designed based on theoretical dimensions and comprehensive theory that can affect the potential teaching and learning possibilities of digital games (Zou et al., 2021)



In order to examine the theories that form the basis of digital games aimed at language learning, firstly, several important learning theories that are usually used for language teaching and learning, as well as the use of computers for language learning, are examined.

Language learning, learning theories and language learning by computer. Language learning has many dimensions and linguists consider different aspects for language and its learning, which include phonology, grammar, vocabulary, semantics, verb conjugation and syntax (1984, al et Akmajian). Usually, sociological and practical or pragmatic aspects that deal with the use of a language in the real social and cultural environment are also added to these aspects. In fact, three important learning theories including behaviorism, cognitive constructivism and social constructivism have played an important role in language teaching theories (Zaphiris & Ang 2008). In addition to different theories for learning and especially language learning, based on the psychology of language, five elements are considered for language skills, which include:

1. Phonetics or phonology that describes the way sounds work in a certain language.
2. Verbs that are sets of rules related to the correct way of writing according to the desired language system and include spelling and punctuation.
3. Lexicography is a list of words along with information about its features - like a dictionary.
4. Morphological science, which examines the construction of words.
5. The science of syntax or phraseology, which examines the rules related to the combination and juxtaposition of words (Zaphiris & Ang, 2008).

But theories such as sociolinguistic theory believe that language learning is related to the way it is used in society and its practical application, and not to the constituent elements of language.

Applied or pragmatic linguistics is related to the study of understanding natural language and especially the study of how the environment affects the understanding and interpretation of meanings. The meaning of environment is a situation that includes all meta-linguistic factors, including social, environmental and psychological factors. Sociolinguistics is also a study of the influence of all aspects of society, including cultural customs, expectations, environment, etc., on the way language is used.

And in this way, pronunciation, accent, politeness and social relations, local advice and wisdom such as proverbs, stories and legends, or the way of speaking and expression are also included (Fasold, 1990). From the point of view of this branch of linguistics, the knowledge and understanding of the constituent elements of language is not important, but the issue that is important is the skill of communication in a society. Learning theories have significantly influenced the creation of language learning tools (Zaphiris & Ang, 2008). Learning language by computer (CALL) is one of the tools that uses learning theories for language teaching and learning. In order to investigate the relationship between language



learning and computer games, we will examine the theories of language learning and how to apply them in computer games.

### **Learning language by computer (CALL)**

Aryadoust and Lim (2021) in a study on the research conducted in the period from 1977 to 2020 regarding language learning by computer, have shown that many studies conducted on language learning by computer have emphasized the usefulness of this learning method. . Of course, the effectiveness of this method for learning has not always been confirmed. According to the research of the aforementioned researchers, the results of learning by each of the branches and methods related to this technology are different. Methods such as simultaneous communication of computers and negotiation interaction, multimedia, remote collaboration or email exchange and digital games have a stronger support for learning, and methods such as blogs, wikis and podcasts have a weaker support for learning. In order to investigate the possibilities of computer games in providing a language learning environment, researches have been conducted. Basically, research on computer games based on language learning is focused on two points of view: computer games as a virtual environment whose purpose is only to provide language learning. (player and game interaction) and computer games as a tool or tool that is used to facilitate joint learning (player and player interaction) (Zaphiris & Ang, 2008).

### **Verbal interaction of the player and the game**

The aim of the research in this field is to investigate the possibility of language learning through computer games, and the researchers intend to design more effective games for teaching languages.

According to experts, less language was used in the first graphic games. The player can handle the game and master it with minimal or no language. In the first games - from 1978 - no verbal language or narrative was used. After the development of computer games in the following decades, the use of computer games for storytelling in the virtual world has become popular. The first attempt to use language is using text, and the player's activities and actions are explained and described with text (Zaphiris & Ang, 2008). Increasing the ability of graphic processing provided the creation of a game with a more accurate world and a world close to reality. According to experts, since languages are ubiquitous in the real world, the virtual world is also full of language use. Game designers became interested in storytelling in their games to create a more believable world in the game. On the other hand, game designers turned to using languages to explain the progress of the game, which is sometimes not very important for playing the game. They also talk to make the characters of the game more believable. In this category of computer games, language skills are needed; Like a text adventure game without understanding the language, players can hardly progress



in the game. Apart from these cases, story scenarios are sometimes narrated by a narrator in the form of text languages. Players must understand some of these narratives to understand the purpose of the game. Basically, it is impossible to play the game without knowing and understanding the conversation. With the continued growth of computer processing power, the use of spoken languages that are usually associated with text languages as subtitles has become common. From this point on, the role of language is noticeable in every part of the games and it is used.

### **Verbal interaction between player and player**

In computer games, the type of language use has also undergone transformation, so that although the understanding and concept of language is still very important, it has changed to the production of language. Players are invited to create a picture related to the virtual social space in the game. The emergence of language-based interaction in computer games means the need to have sufficient language and sociological skills to have a successful game.

### **Language learning based on the theory of behaviorism.**

The emergence of the theory of behaviorism at the beginning of the 20th century had a significant impact on language learning. It is noteworthy that the majority of computer-based language teaching in the 1960s and 1970s was influenced by behaviorist theory (Zaphiris, Ang 2008). . Thus, according to this theory, encouragement and punishment are considered as the first factors in language learning; And teaching with this approach provides the learner with sets of learning patterns (Olson & Hergenhahn, 2001). In this period of time, computer learning programs, usually including teaching grammar and vocabulary through repetition and using a computer model as a teacher, were designed; And its method was to provide immediate feedback, either positive or negative, to the answers provided by the learner. The focus of language education has been more on the direct teaching of grammar and translation instead of the practical use of the language

Of course, creating a habit in learning through encouragement and punishment faces many objections, but it seems suitable for some aspects of learning. According to researchers and experts, behavioral learning in the field of language is useful for learning the language from the aspects of phonetics or phonology, grammar and lexicology (Zaphiris & Ang, 2008). In learning the sounds of the language, for the correct pronunciation and reading of the target language, it is necessary to imitate the sounds and syllables - in fact, to respond to the stimuli (correcting the teacher and asking for repetition). Before using it in a text or practical situation, the response to the stimulus in language learning is usually used when reading and producing sounds and pronunciation when seeing written words.



In learning behaviorism, without involving too much mental processing in the learner, grammar and the way of writing words are done in the same way as the production of sounds.

So that the correct and desirable answers for writing (production or recognition of written letters and signs) are presented as conditioned learning. Vocabulary learning is done through behaviorism by associating words with each other or matching a word with other words or pictures and other concrete examples.

At the same time, when the level of learning is advanced, the language learner realizes that the sound of each phoneme in different words can be different, and some words in different sentences and texts may have different meanings; And it is at this stage that the behaviorist learning function of the language is disturbed because the learner is not able to relate the sounds, writings and words to every possible new sentence that he encounters based on his acquired learning. Because every sentence is actually a new sentence) (Zaphiris & Ang., 2008).

Since the end of the 20th century, the mental patterns of language learning underwent fundamental changes. Many behavioral learning theories faced theories based on sociological and constructivist approaches (Warschauer, 1996; Hoven, 1999).

### **Learning language constructivism.**

In a constructivist learning theory, it is important to pay attention to the learner's previous knowledge and experiences in building new concepts and knowledge (Hessling & Parker 2019). In constructivist learning environments, the learner uses active learning techniques such as conflict, participation, experiment, problem solving, and discovery, and the role of the teacher and trainer is to guide and facilitate the learning process (Feridonnejad et al., 2019).

Based on the views of constructivist learning, the second stage of computer-based language learning emerged in the late 1970s and early 1980s. This stage emphasized that language learning through computers, instead of emphasizing on language, should emphasize more on the practical use of languages and their application. In this way, communication approaches for language learning emerged at this stage

and emphasized that computer-based learning should focus more on the use of language forms and encourage learners to express original and non-repetitive statements and expressions instead of teaching them to use pre-made language formulas (Zaphiris & Ang, 2008).

Considering the theory of cognitive constructivism, the researchers believe that although the behavioral learning method helps the learner in transferring and learning words, the meaning and meaning of each word must be built and placed in the learner's mind; Because in the learner's mind, while facing a certain word in different contexts and environments, it



is continuously organized, changed and updated. Using a word in a new context and environment is not something that the learner learned through behavioral learning.

In addition, it does not seem logical that the production of new expressions and new word structures are learned through imitation or conditioned responses. According to the process of cognitive constructivism, during learning, language learners are taught to create a new sentence that they have not encountered or heard before. Also, sentence construction rules require mental processing. Vygotsky (1930) with more emphasis on the social context of learning, believed that learning any subject is done on two levels. first by interacting with others and then by integrating and joining it in the person's mental map; Therefore, he believed that social interaction has an essential role in cognitive development. According to Vygotsky, the socio-cultural environment gives people the cognitive tools needed to learn. Emphasis on social constructivism changed the interaction of learners with the computer to the interaction with other people through the computer. The use of this method of learning through computers started in the late 1980s and early 1990s. The approach of this theory was to place the learner in a real environment. In this way, the computer was not considered only as a tool to learn language skills (Zaphiris & Ang, 2008).

But based on the research of Zou et al. (2021), which is based on the articles and research done on language learning based on digital games. And in the background section, it was mentioned about this research - many other theories and theories have been supported for language learning with the help of digital games, which in total has two linguistic or educational dimensions, and some of them are mentioned in this article.

Linguistic theories are examined below:

The hypothesis of "mental conflict load" proposed by Hulstijn and Laufer (2001), states that the effect of an exercise on vocabulary learning is determined by the amount of conflict load, which includes three factors: Need (motivation of the student to do the assignment), search (the student's effort to find the meaning or its form) or evaluation (the student's action to compare the meaning and form of a word).

According to this hypothesis, the processing depth of a word - and not its duration - has a fundamental effect on long-term memory in vocabulary learning. Thus, in the studies conducted on language learning based on games, it has been shown that playing games that include different instructions and dialogues is one of the influential factors in language learning. Krashen's input hypothesis has also been the basis of the theory of several studies on language learning based on digital games. This hypothesis states that language learning occurs when learners are exposed to linguistic input that is a step beyond their current level of knowledge. The educational and educational theories have been examined in the following: based on the mentioned research, several theories confirm the importance of the role of interaction, cooperation and competition in learning. Among these theories is about interactive, competitive and cooperative learning. Lang's (1983) interactive learning hypothesis and Swain's (2005) theory about cooperative dialogue are among these studies.



Another theory that has been used to support the importance of using digital games for learning is the area of proximal development related to psychologist Vygotsky (1987). which is related to the difference between the learner's potential level of progress and his actual level of progress and takes into account the difference between the learner's ability to solve problems independently or with the help of another person, which means that learning assistance should be done taking into account the learner's knowledge level and needs .

Some articles also put Mayer's (2001, 1997) theory of multimedia learning based on the effectiveness of visual information presented through images, videos and sounds on learning as a scientific and theoretical support for their research in language learning through digital games.

Another study (2018, al et Wei) examined the theory and strategies of personal learning and the effect of digital games according to this strategy for language learning and confirmed that personal learning increases learning productivity. In this research, the theory of fascination and its effect on the learning process with digital games have been discussed. The fascination theory of Chixant-Mihai and Davis 1975 expresses the state of immersion and deep concentration in an activity, which results in a feeling of satisfaction that causes effective learning.

The research done on game-based learning emphasizes the learning process that happens in the game and the role of designing educational games and how to design them. As reviewed in this article, the research conducted by Zou et al., which is a relatively new study, has reviewed a number of studies conducted on digital games based on language learning. The study of this group has also shown useful results about game design. According to the statement of some researchers about the important role of interaction in providing opportunities for learners to compete and interact with fellow players - which was already mentioned - designing games that require more interaction are more effective in learning. Also, the design of games based on inter-group and intra-group cooperation has been suggested as effective methods to improve the learning progress of weaker students and eliminate the level gap between them and stronger students. To design and build an interactive educational game with a hand-held device, Hung and Young (2015) suggest six main elements from the perspective of a face-to-face game in the classroom:

Active participation, sequential engagement with play, equal participation, immediate response, cooperation and interdependence of resources. To increase the motivation of learners and ensure their active participation in the game, a clear goal and its challenges are needed. For the continuous involvement of learners in the game, it is necessary to have a sense of pleasure and satisfaction for concentration and solving challenges and learning. They also suggest that games should be designed for devices accessible to all so that players have equal opportunities to play with their fellow players and learn. Challenging students' thinking skills should be considered in designing games. Because, as shown, the need for high cognitive load promotes effective learning, but it is necessary to consider a suitable level for it (Wang & Hwang 2016). Also, for the design of the game, it is necessary to



integrate the clear goals of the game into the dynamics of the game and to embed appropriate learning strategies in the game (Ferrer-Calvo, 2017).

Wei et al. (2018) believe that it is very important to consider personal learning strategies in competitive games in order to create an educational environment with the least anxiety and increase the sense of immersion and inner interest. Of course, Wu and Huang (2017) argued that intrinsic motivation has little effect on students' learning results, but informing them of the learning results they expected has a greater effect on their cognitive performance than the feeling of pleasure. Therefore, it is necessary to show the level of progress in game design to activate the cognitive interaction of learners. Pan (2017) stated that motion sensor games should be more intuitive and learning should be done independently and directly, and complex situations and computer commands should be avoided in these games; And in this way, it helps to make games more user-friendly.

## Conclusion

In this article, with the aim of studying the relationship between educational facilities in digital games and learning foreign languages, the category of game, its definition and its relationship with learning were discussed first. Then the role of games in language learning was studied. Some theories of language learning and communication and how to use them for language learning through digital games were also studied. While reviewing the new studies done by the researchers, the digital game based on language learning and its effectiveness were studied.

According to the researches carried out in the last decade and mostly in the last five years, - which was also referred to in this article- Digital games have been more effective in increasing the learning of the meaning of words and the ability to retain and remember long-term words and terms than traditional methods. Some researchers have stated that learners have shown more interaction in the game environment, and some have confirmed the positive aspect of digital games in terms of cognitive load. Of course, in a case of research, it has been stated that learning language vocabulary based on digital games is less effective than other methods.

The same study has confirmed the positive results of improving the pronunciation of words by the learner, and the reason for the effect of digital games on learning, especially among learners with a lower level of learning, is the possibility of practicing speaking in the game environment with less anxiety.

Other researches have also confirmed that digital games facilitate the understanding of content through reading and listening more than other methods; And it seems that the reason for this is that frequent playing leads to more exposure to the target language and, as a result, better learning results.



A number of researchers, especially focusing on the motivation of learners while playing games, have stated that game-based language learning leads to more motivation than other methods. In another study, the participants were asked to evaluate their learning attitudes and experiences, and the result showed that the desire to learn, satisfaction and personal acceptance of improvement are important factors that contribute to effective learning. The results also showed that even unmotivated students were able to achieve significant learning results, although this achievement was less for students with low motivation. In addition, it was found that certain characteristics such as learners' extrinsic motivation, enjoyment of games, perceived learning achievements and anticipation of their achievement had a great impact on learning outcomes. Of course, the important point about the word as one of the important elements in language learning is that learning is done when the learner or player knows the word in two ways, written and spoken or heard. In fact, the first and most basic step to identify a word is to know the relationship between the form and the meaning of that word; And in order to know a word, it is necessary to know other aspects of the word, such as its role (verb, adverb, adjective, etc.) and its relationship with other words. Also, in game design, attention should be paid to two aspects (receptive and productive) of learning.

In this way, it is necessary to clarify that the digital game helps the learner to produce language and use it, or its purpose is only to increase the understanding of the language concept. The achievements of the mentioned researches, together with the learning theories examined in this article, provide language teachers and learners how to use digital games and the limitations and opportunities of its use. Also, this study provides experience and design ideas for game designers with the aim of teaching and learning foreign languages. Designing computer software for learning foreign languages for Iranian and Farsi language learners, taking into account appropriate cultural aspects, can be welcomed by a wide range of learners. Also, this research, from an educational and design aspect, provides a perspective for teaching and learning Persian language for non-Persian speakers. A study of the culture that is induced through the game and the investigation of the culture that is associated with language learning and its connection in the existing digital games and its effect on language learners and other learners and users can be investigated in separate studies.

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